

**Headquarters, Naval Facilities Engineering Command  
Washington Navy Yard  
Washington, DC**



*Energy 2001*

# *Sustainable Design--Myth or Miracle?*

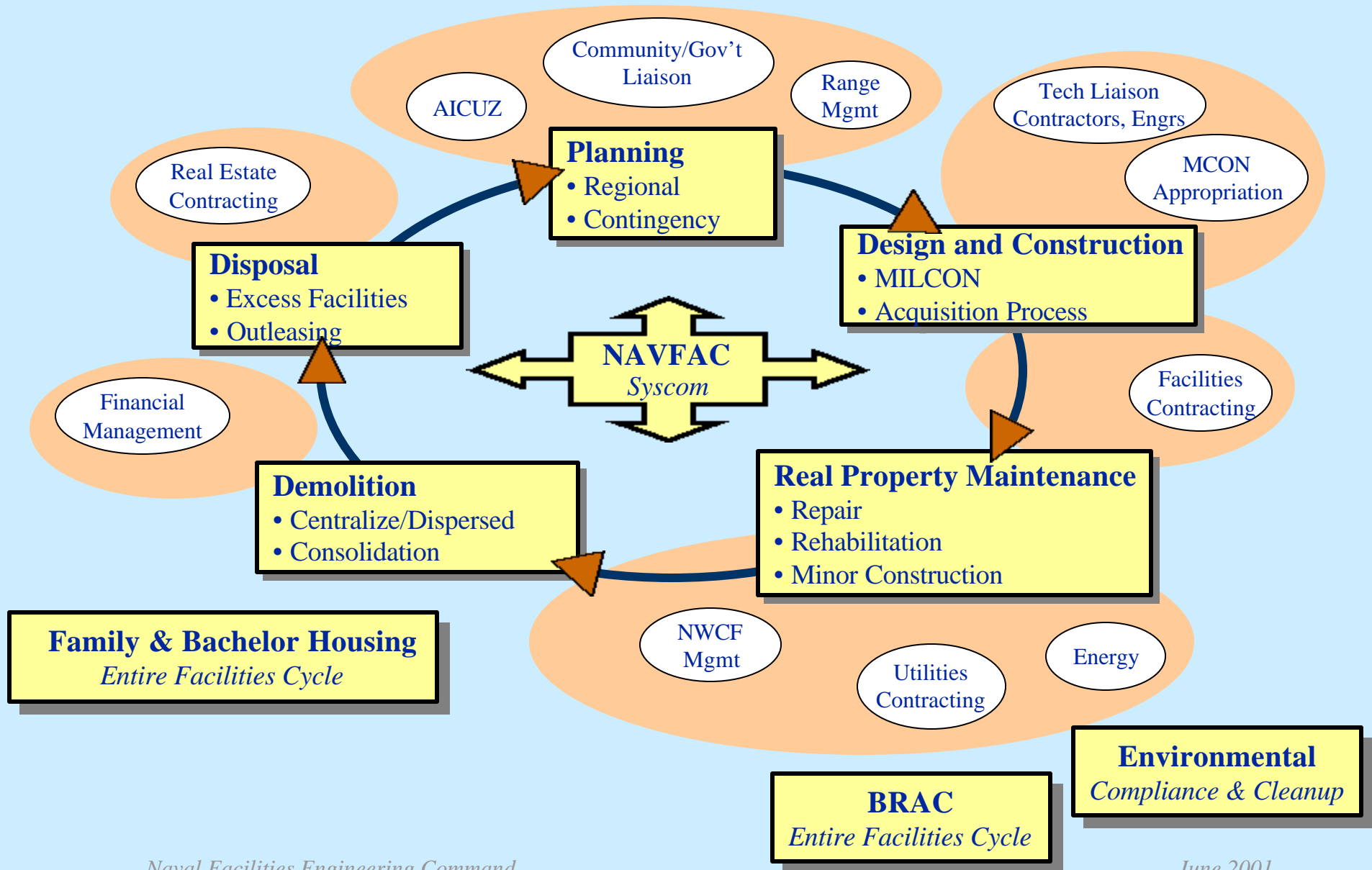
**Tony D. Hinson, P.E  
Deputy Chief Engineer  
Naval Facilities Engineering Command**

**5 June 2001**

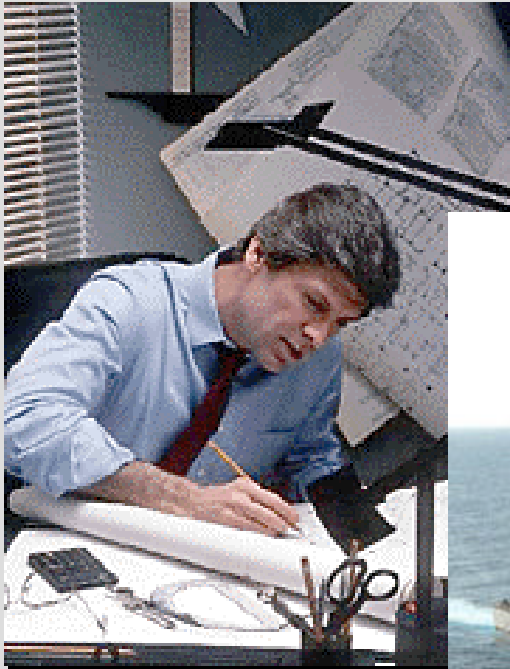
# ***We Will Cover....***

- ◆ **Overview of DOD Tri-service approach**
  - **How did it start? Policy, training, facility project initiatives**
  - **Performance measurement and lessons learned**
- ◆ **DOD Video: Tri-Service emphasis and examples**
- ◆ **Next steps**
  - **Moving to base and regional development**
  - **Performance measures**

# *The Job--Facilities Management*



# Challenges--Program



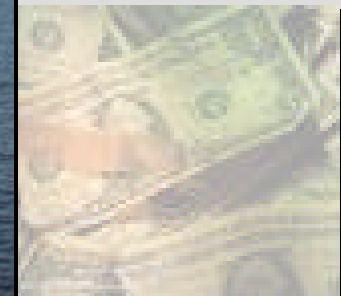
**Engineering**



**Operational**



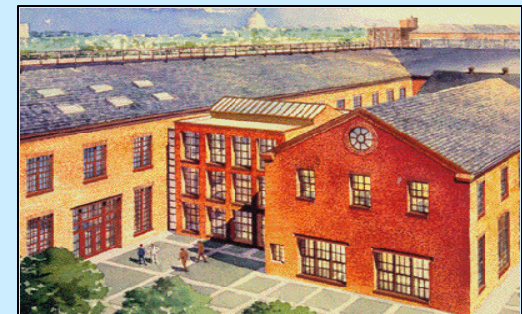
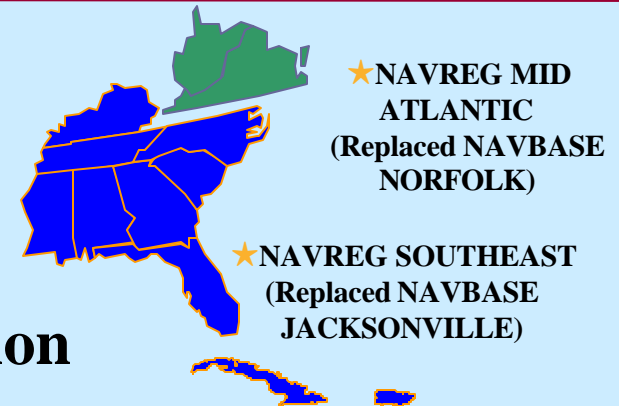
**Political**



**Financial**

# *Challenges--Trends and Innovation*

- ◆ **Increased Regionalization**
  - Consolidating Functions/Commands
  - Waterfront and Airfield Recapitalization
  - Support Quality of Service Issue
- ◆ **Adopt New Acquisition Strategies**
- ◆ **Emphasize Design-Build**
- ◆ **Emphasize Sustainable Development**
- ◆ **Implement Electronic Acquisition**



# ***How Did It Start?***

- ◆ **Operational requirement to attain improved facilities for Quality of Service**
  - Quality of Life
  - Quality of Work (conditions)
- ◆ **Engineering requirement for innovation in design process to improve quality of delivered facilities**
- ◆ **Financial requirement to reduce facilities costs**
  - Reduce DOD budget
  - Within budget fund sailors, soldiers, airmen, and weapons
- ◆ **Political requirement to address emerging concern for Global Climate Change**

# ***Policy Development & Training***

- ◆ **1995-1996 Field Workshops**
- ◆ **1996-1997 Pilot Projects Initiated**
- ◆ **18 June 1998 Issued NAVFAC Policy**
  - **Incorporate sustainability principles in all projects**
  - **Select A/Es with sustainable knowledge & experience**
  - **Specify EPA designated products**
- ◆ **NAVFAC lead development of Sustainable Training Regimen for Tri-Service use**
- ◆ **Initial training provided to all field offices**

# ***National Policy Development***

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- ◆ **Dec 1997 Kyoto, Japan Summit and Agreement**
- ◆ **July 1998 White House Climate Change Task Force and Sustainable Design Working Group**
- ◆ **2-5 May 1999 National Town Meeting for Sustainable America**
- ◆ **25 June 1998 President Clinton Radio Address**
- ◆ **3 June 1999 EO 13123 Greening Gov't Through Efficient Energy Management**

# *Sustainable Development Practice*



**NAVFAC HQ Bldg  
Washington Navy Yard**



**NAVSEA Complex  
Washington Navy Yard**

- ◆ **Lower Total Ownership Costs (TOC), including environment**
- ◆ **Teaming with Dept of Energy, U S Green Building Council, AIA Committee on the Environment, National Institute of Building Sciences (NIBS), etc. (developing the “Whole Building Design Guide”)**

# ***NAVFAC Project Initiatives***

- ◆ **Washington Navy Yard Renovation of Building 33**
  - **Project at 99% design complete**
  - **RMI Charrette held August 1995**
  - **Original Est. Cost - \$19.8 million**
  - **Revised Est. Cost - \$19.9 million**
  - **Estimated Savings - \$130,000/year (energy only)**
  - **Payback - Less than 1 year**

# ***NAVFAC Project Initiatives***

- ◆ **Washington Navy Yard Renovation of Building 33 (continued)**
  - **Super insulation**
  - **High efficiency HVAC**
  - **Chiller size reduced from 500 to 320 tons**
  - **Ambient lighting reduced from 50 to 30 footcandles**
  - **Construction waste and demolished materials recycled**

# ***NAVFAC Project Initiatives***

- ◆ **Washington Navy Yard Renovation of Building 33 (continued)**
  - **Skylights for daylighting**
  - **Purging of building's air system**
  - **Indirect pendant lighting**
  - **Energy-efficient fluorescent lighting**
  - **Daylight and occupancy sensors**
  - **Reduced plug loads**

# ***Building 33 - Navy Yard***

## ***SUCCESS STORY***

- ◆ **Sustainable Design**
- ◆ **\$21 million**
- ◆ **156,000 sf**
- ◆ **NAVFAC and JAG  
Headquarters**
- ◆ **3 to 4 stories**
- ◆ **Completed 9/98**



# ***BEQ, NTC Great Lakes***

## ***SUCCESS STORY***

- ◆ **Sustainable Design**
- ◆ **\$70 million**
- ◆ **9 buildings - 450,000 sf**
- ◆ **Housing for 2,250 sailors**
- ◆ **3 to 5 stories**
- ◆ **15 acre site**
- ◆ **Completed 12/98 - 9/99**



# ***BEQ, NTC Great Lakes***

## ***AWARDS***

- ◆ **USGBC LEED Certified January 2000**
- ◆ **White House “Closing the Circle” Award June 2000**



*Naval Facilities Engineering Command*



*June 2001*

# ***Performance Measurement***

- ◆ **Objectives**

- **Determine actual, validated savings**
- **Evaluate return-on-investment (ROI)**

- ◆ **Approach**

- **Meter and monitor**
- **Benchmark against traditional design**
- **Evaluate design, construction, and delivery process impact on savings**

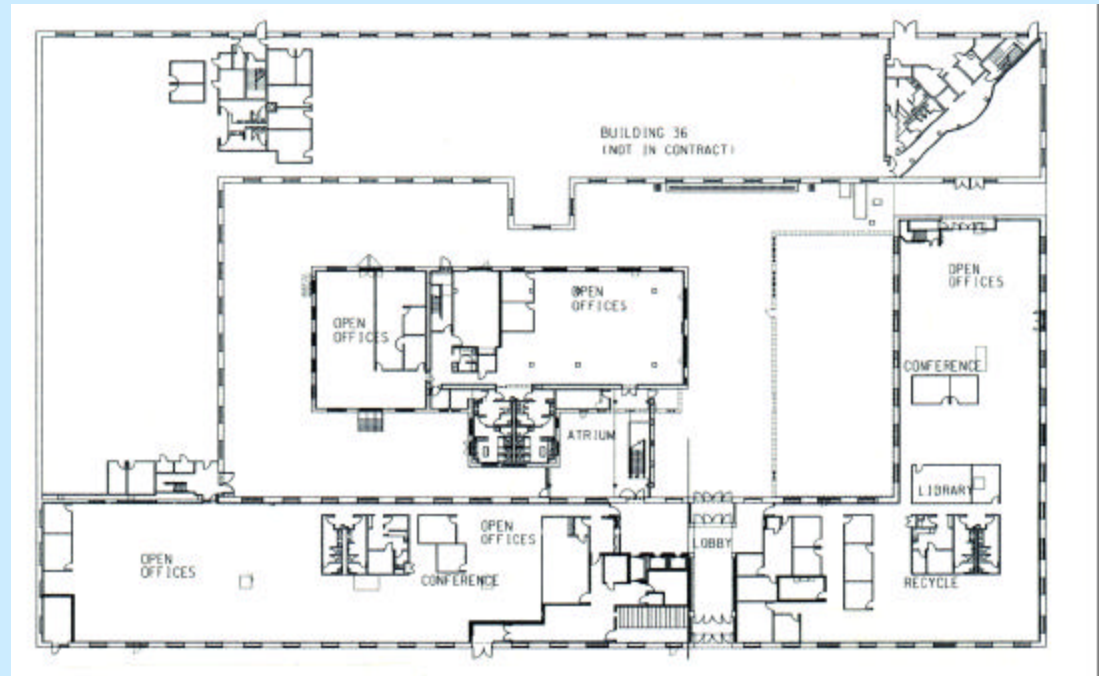
# ***Performance Measurement (cont'd)***

## **◆ Participants**

- NAVFAC Chief Engineer (policy & guidance)**
- EFA Chesapeake (design & construction)**
- NAVFAC Admin (daily bldg trouble calls)**
- PWC Washington (bldg operation & mgmt)**
- NAVFAC Engineering Service Center (analysis)**
- Pacific Northwest National Laboratories (metering, monitoring, and analysis)**

# *Building 33 - Profile*

- ◆ Built in 1850
- ◆ 45 foot open-bay industrial building
- ◆ Renovated 1997-1998 for office, admin spaces
- ◆ Built shell-within-a-shell in historical structure



# ***Performance Results***

## **◆ Energy Savings**

- 15% Net Savings compared to Bldg 36**
- \$58,000/year Actual, validated savings**
- 6.94 Savings to Investment Ratio (SIR)**
- 1.64 Simple Payback period**

## **◆ Highlights**

- 20% savings in Chiller and Mech Systems**
- 4% overhead light savings eliminated by 21% increased requirement for task lighting**
- Plug loads and Steam provided no savings**

# ***Lessons Learned***

## **◆ General**

- Use Integrated, Whole Building Design approach**
- Use sustainable building rating systems (like USGBC LEED) to establish and focus project goals**

## **◆ Project Planning**

- Integrate sustainability from inception**
- Set project budget based on design with lowest total life-cycle cost**
- Track achievement of sustainable goals**

# ***Lessons Learned (cont'd)***

## **◆ Design**

- Define sustainable goals at beginning**
- Set clear performance criteria**
- Make all stakeholders part of team**
- Less prescriptive can increase innovation**
- Design energy management system to measure sustainable performance**

## **◆ Construction**

- Involve contractor at earliest possible stage**
- Apply verification procedures set in design**

# ***Lessons Learned (cont'd)***

- ◆ **Commissioning/Verification**
  - **Develop detailed commissioning plan during design phase**
  - **Ensure all building systems interact in accordance with design intent**
  - **Train building tenants and maintenance staff in sustainable features and operation**
- ◆ **Operation and Maintenance**
  - **Minimize fixture variety and unusual types**
  - **Include operation and maintenance staff at planning and design stages**

# Summary

- ◆ DOD has policy, training, and achieved energy savings
- ◆ Key: Focus on total life-cycle costs, integrated design, commissioning, and performance measurement
- ◆ Innovate
- ◆ Share



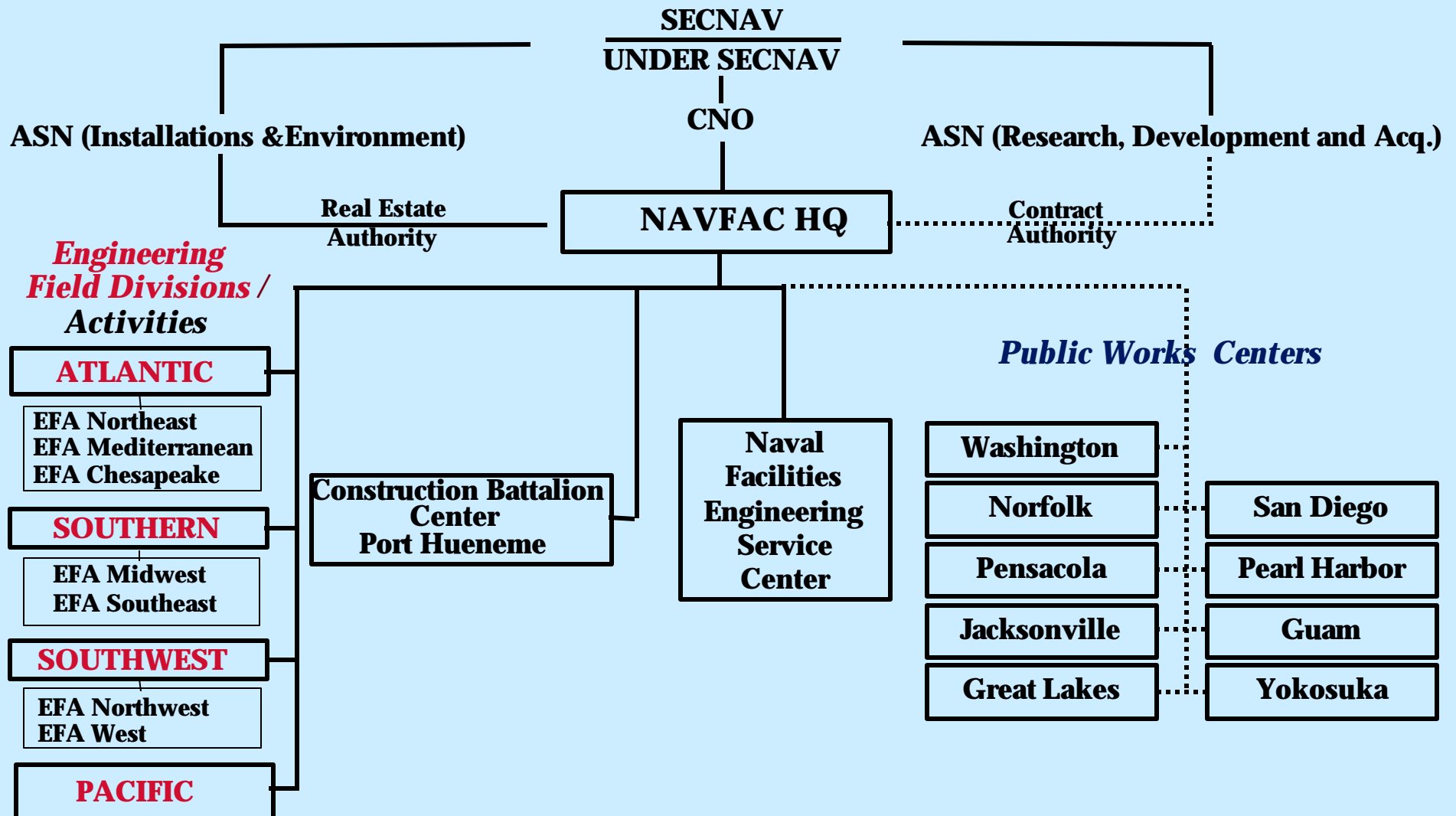
Additional Information available at  
[www.navfac.navy.mil](http://www.navfac.navy.mil)  
POC Tony Hinson, Chief Engineer Directorate,  
NAVFAC Headquarters  
(202) 685-9168, [HinsonT@Navfac.Navy.Mil](mailto:HinsonT@Navfac.Navy.Mil)

# *A Miracle that Saves!*

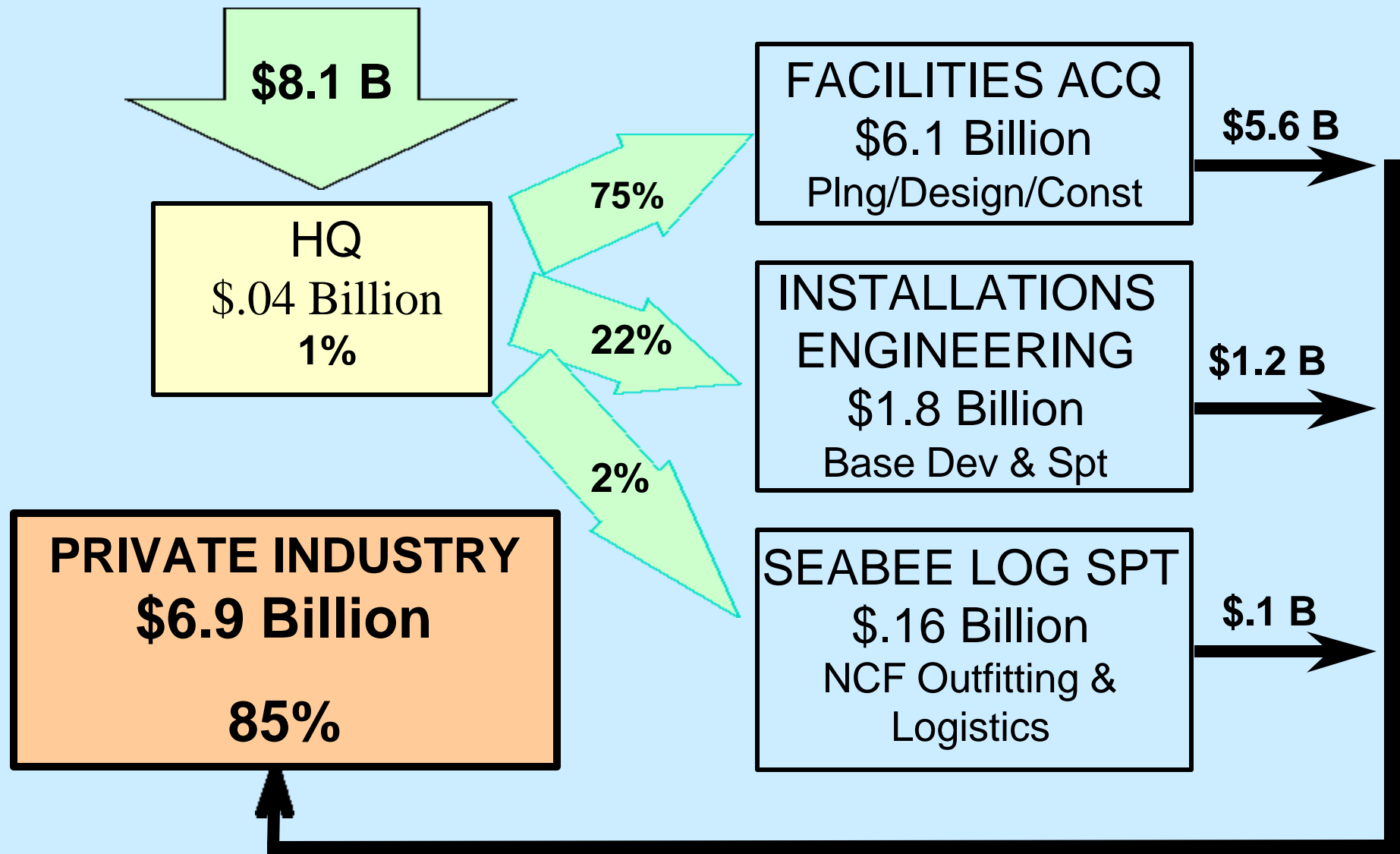


# *Backup*

# *The Naval Facilities Engineering Command*

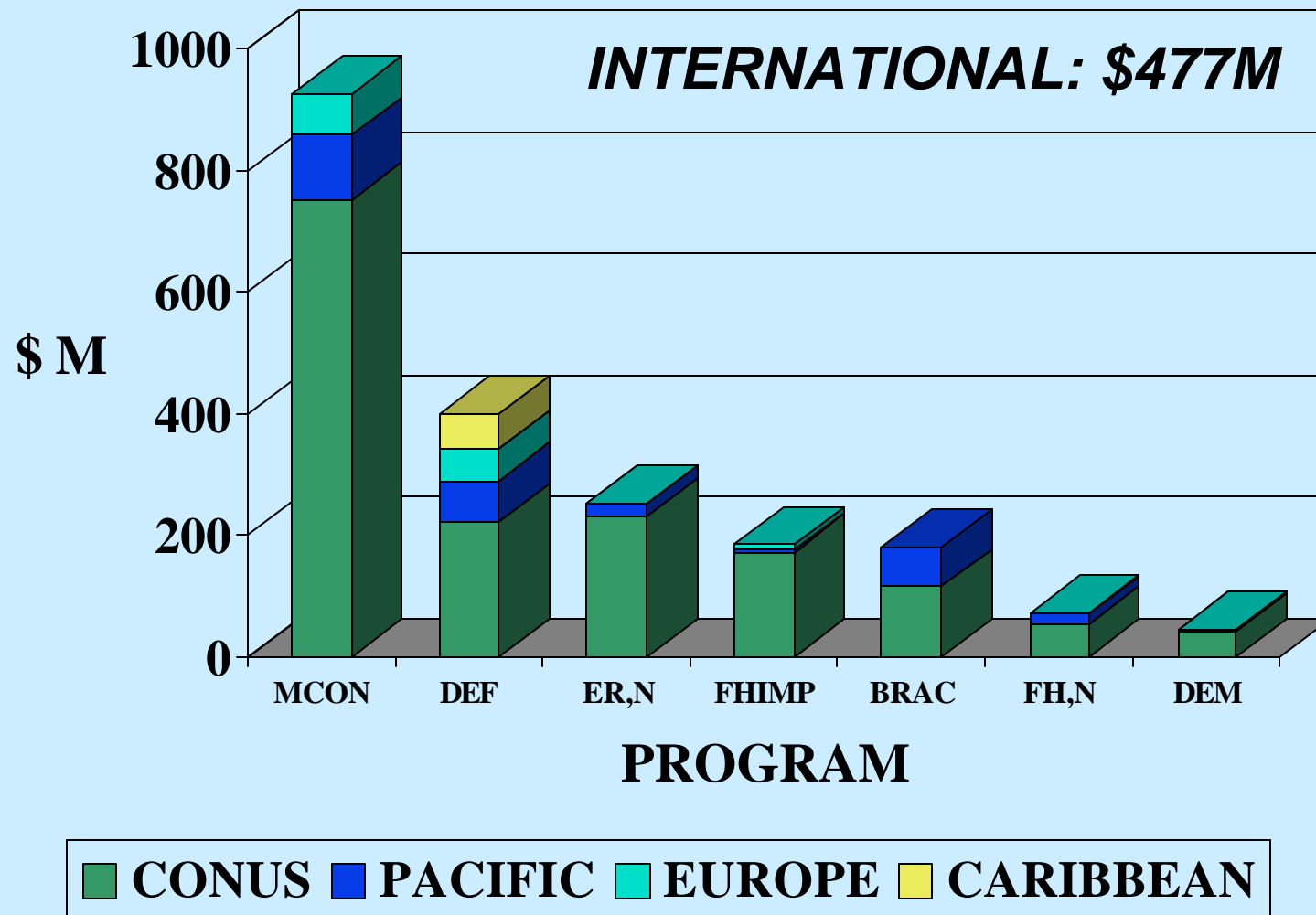


# NAVFAC Macro Funding Flow - FY 00



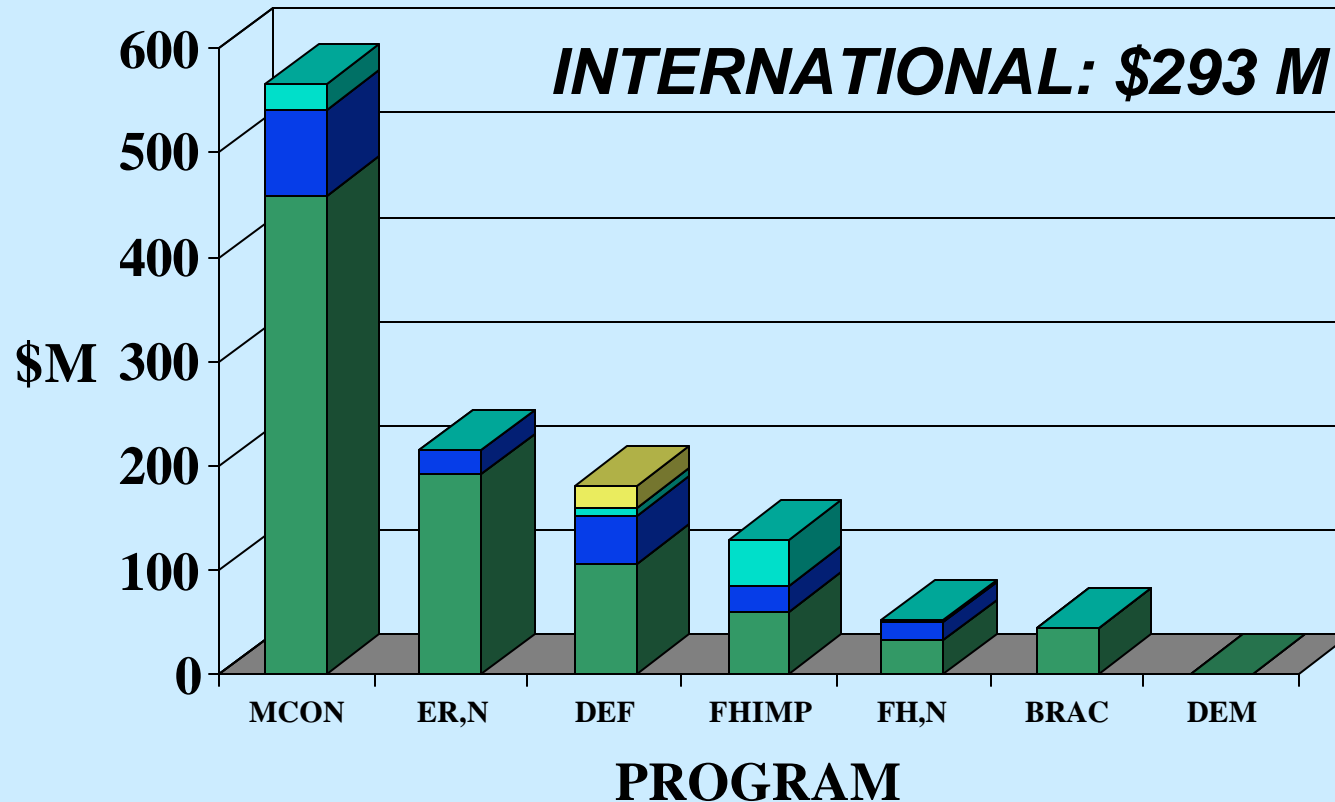
# ***FY01 Global Workload***

**TOTAL PROGRAM: \$2.1 B**



# ***FY02 Global Workload***

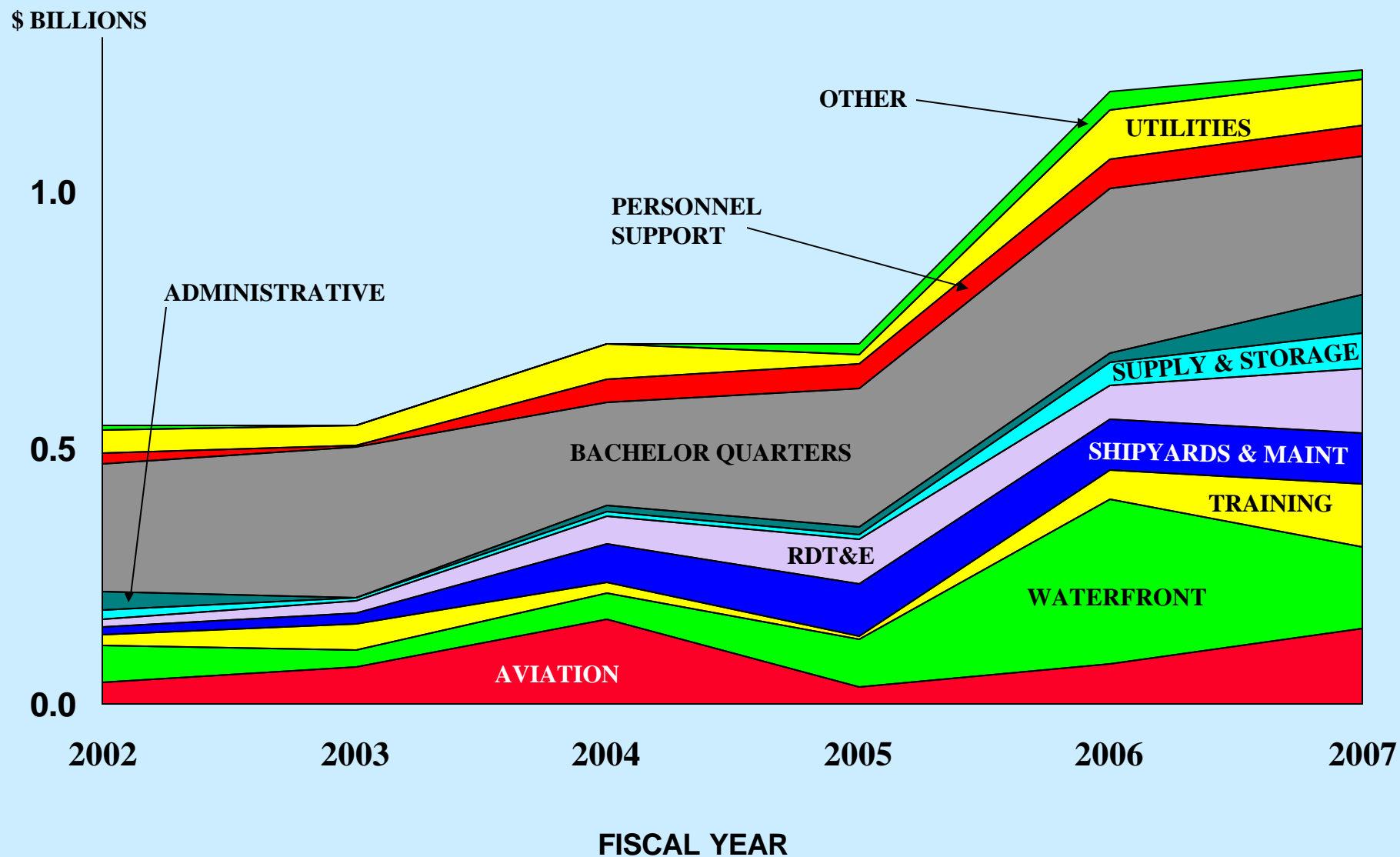
**TOTAL PROGRAM: \$1.2 B**



■ CONUS ■ PACIFIC ■ EUROPE ■ CARIBBEAN

\* FY02 Demo program unknown at this time

# MCON Construction Type



# ***FY 2002 Design List***

## **PROJECTS UNDER \$5M**

### **ATLANTIC DIVISION**

BRUNSWICK ME NAS

INDIAN HD MD NAVEODTECHDV

KEFLAVIK ICELAND NAS

NEW RIVER NC MCAS

NORFOLK VA NS

PATUXENT RIVER MD AWCACDV

QUANTICO VA MCAF

SIGONELLA ITALY NAS

SOUDA BAY CRETE NAVSUPACT

P-3 SUPPORT FACILITY

JT SVC EOD EQUIP MAG EVAL

SOLID WASTE DISP CONN CHRG

PROPERTY CONTROL FACILITY

DEPERMING PIER REPLACEMENT

MARINE OCEAN SCIENCE LAB

AIRCRAFT FIRE AND RESCUE STA

P-3 SUPPORT FACILITY

SEWAGE TREATMENT PLANT ADD

### **SOUTHWEST DIVISION**

BANGOR WA SWF PAC

CAMP PENDLETON CA MCAS

CAMP PENDLETON CA MCB

WHIDBEY IS WA NAS

UTILS & SITE IMPVS

AIRCRAFT HANGAR IMPRS

HELO OUTLYING LANDING FLD

P-3 SUPPORT FACILITY

### **SOUTHERN DIVISION**

BEAUFORT SC MCAS

AWSE WAREHOUSE

## **PROJECTS \$5M - \$10M**

### **ATLANTIC DIVISION**

CAMP LEJEUNE NC MCB

CAMP LEJEUNE NC MCB

CAMP LEJEUNE NC MCB

NORFOLK VA NS

QUANTICO VA MCCOMBDEV CMD

WASH DC NAF ANDREWS AFB

HIGH EXPLOSIVE MAGAZINE

ENGR EQUIP MAINT SHOP

LANDFILL CELL

AIRFIELD PAVEMENTS UPGRADE

BEQ

BEQ

# ***FY 2002 Design List***

## **PROJECTS \$5M - \$10M**

### **PACIFIC DIVISION**

GUAM NAVACTS

BEQ MODERNIZATION

### **SOUTHWEST DIVISION**

LEMOORE CA NAS

BEQ

TWENTYNINE PALMS CA MAGCC

VEHICLE WASH STATION

TWENTYNINE PALMS CA MAGCC

ACADEMIC INSTRUCTION BLDG

YUMA AZ MCAS

STATION ORDNANCE AREA

YUMA AZ MCAS

LAND ACQUISITION

### **SOUTHERN DIVISION**

BEAUFORT SC MCAS

CHILD DEVELOPMENT CENTER

GULFPORT MS NCBC

MOBILIZATION OPS FACILITY

## **PROJECTS OVER \$10M**

### **ATLANTIC DIVISION**

PATUXENT RIVER MD AWCACDV

ADV SYSTEMS INTEG FAC (VI)

NORFOLK VA NS

AIRCRAFT MAINT HANGAR RPL

CAMP LEJEUNE NC MCB

BEQ

LARISSA JOINT HQ CMD

BEQ

NORFOLK VA NS

BEQ MODERNIZATION

NORFOLK VA NS

WATERFRONT ELEC UPGRADE

CAMP LEJEUNE NC MCB

BEQ

NORFOLK VA NS

PIER REPLACEMENT (INCR I)

NEWPORT RI NS

SWOS APPLIED INSTR BLDG

BRUNSWICK ME NAS

BEQ

# ***FY 2002 Design List***

## **PROJECTS OVER \$10M**

### **PACIFIC DIVISION**

PEARL HARBOR HI PWC

PEARL HARBOR HI NS

CAMP HM SMITH HI CINCPAC

SANITARY SEWER

BEQ MODERNIZATION

CINCPAC HDQTRS (INCR III)

### **SOUTHWEST DIVISION**

CAMP PENDLETON CA MCB

SAN DIEGO CA NSSD

CAMP PENDLETON CA MCB

EL CENTRO CA NAF

BREMERTON WA NS

INDOOR PHYSICAL FIT FAC

GENL PURP/BERTHING PIER

BEQ

TRANSIENT STUDENT BEQ

PIER REPLACEMENT (INCR II)

### **SOUTHERN DIVISION**

GREAT LAKES IL NTC

GREAT LAKES IL NTC

RECRUIT BARRACKS

RECRUIT BARRACKS

# ***FY 2003 Design List***

## **PROJECTS UNDER \$5M**

### **ATLANTIC DIVISION**

CAMP LEJEUNE NC MCB  
NEW RIVER NC MCAS

FITNESS CENTER  
PROPERTY CONTROL FACILITY

### **PACIFIC DIVISION**

LUALUALEI HI NM

SHORE POWER

### **SOUTHWEST DIVISION**

CAMP PENDLETON CA MCAS  
LEMOORE CA NAS  
MIRAMAR CA MCAS  
YUMA AZ MCAS

LOOP FIRE WATER MAINS  
TACTICAL AIR COMBAT CENTER  
HIGH EXPLOSIVE MAGAZINE  
COMBAT AIRCRAFT APRON

### **SOUTHERN DIVISION**

CORPUS CHRISTI TX NAS  
PARRIS ISLAND SC MCRD  
PARRIS ISLAND SC MCRD  
PASCAGOULA MS NS

RUNWAY EXTENSION  
RECRUIT BN INCLIMATE  
RECRUIT TRAINING FAC ADDN  
NEW CHANNEL

## **PROJECTS \$5M - \$10M**

### **ATLANTIC DIVISION**

CHERRY POINT NC MCAS T-56  
DAHLGREN VA NSWCTR DIV  
WASH DC NAF ANDREWS AFB  
YORKTOWN VA NWS

TEST CELL  
THEATER WARFARE INTEGRATION CNTR  
BEQ  
BEQ REPLACEMENT

# ***FY 2003 Design List***

## **PROJECTS \$5M - \$10M**

### **PACIFIC DIVISION**

GUAM MI COMNAV MARIANAS  
PEARL HARBOR HI NS  
PEARL HARBOR HI NS  
PEARL HARBOR HI NSY

BEQ REPLACEMENT  
BEQ REPLACEMENT  
BEQ REPLACEMENT  
DRYDOCK 2 WATERFRONT FAC

### **SOUTHWEST DIVISION**

BREMERTON PUGETSND WA NSY  
CAMP PENDLETON CA MCAS  
EVERETT WA NAVSTA

INDUSTRIAL WASTE TREATMENT FAC  
AVIATION ARMAMENT SHOP  
SHORE INTER MAINT FAC

### **SOUTHERN DIVISION**

JACKSONVILLE FL NAS  
KEY WEST FL NAS  
PANAMA CITY FL DIVSALTRAC

AIRCRAFT PARKING APRON  
AIR TRAFFIC CONTROL/OPS BLDG  
U/WTR SHIP REPAIR TRAINING FAC

## **PROJECTS OVER \$10M**

### **ATLANTIC DIVISION**

KITTERY ME PORTSMOUTH NSY  
NORFOLK VA NS  
NORFOLK VA NS

TRANSIENT BACH ENLIST QTRS  
WATERFRONT ELEC UPGRADE  
PIER REPLACEMENT (INCR II)

### **PACIFIC DIVISION**

KANEOHE BAY HI MCB  
PEARL HARBOR HI NS  
PEARL HARBOR HI NSY

BEQ  
BEQ REPLACEMENT  
DRYDOCK ELEC DIST SYS IMPV

# ***FY 2003 Design List***

## **PROJECTS OVER \$10M**

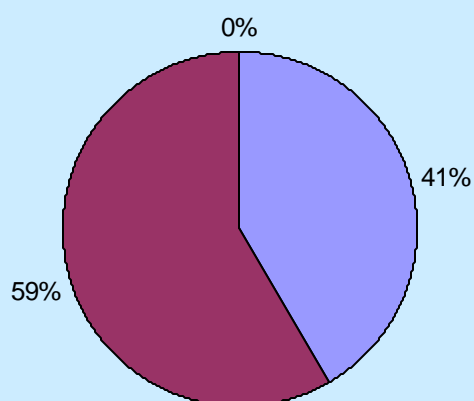
### **SOUTHWEST DIVISION**

BREMERTON WA NS	BEQ
CAMP PENDLETON CA MCB	BEQ
CAMP PENDLETON CA MCB	AAAV SCHOOL/MAINT FAC
CHINA LAKE CA NAWCWPNSDIV	AIRFIELD PAVEMENT UPGRADE
EL CENTRO CA NAF	ORDNANCE LOAD PADS (PH II)
EL CENTRO CA NAF	BEQ/GALLEY
LEMOORE CA NAS	STRIKE WARFR STRATEGY CTR
SAN CLEMENTE IS CA NF	BEQ
SAN DIEGO CA SPAWARSYSCEN	C4I SYSTEM INTEGRATION
TWENTYNINE PALMS CA MAGCC	ENLISTED DINING FAC
TWENTYNINE PALMS CA MAGCC	BEQ

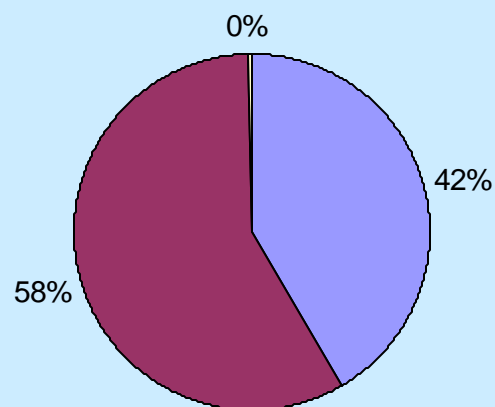
### **SOUTHERN DIVISION**

BEAUFORT SC MCAS	AIRCRAFT ACOUSTICAL ENCL
GREAT LAKES IL NTC	RECRUIT BARRACKS
GREAT LAKES IL NTC	RECRUIT BARRACKS
PENSACOLA FL NAS	BEQ

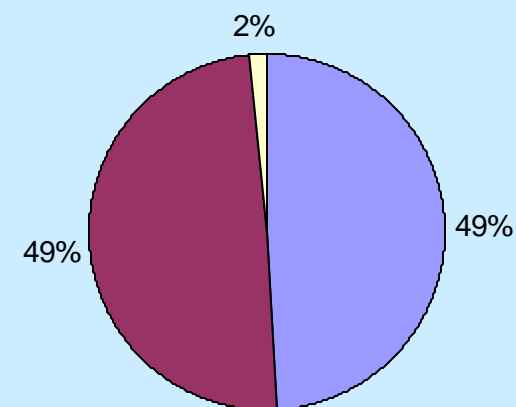
# ***DESIGN APPROACH***



***FY 01: \$1.7 B***



***FY 02: \$1.0 B***



***FY 03: \$1.3 B***

■ DB   ■ 100% DESIGN   ■ UNDECIDED